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Newsletter of the Commonwealth's environmental oversight of the Paducah Gaseous Diffusion Plant

Soil Piles Identified on Bayou Creek and Little Bayou Creek

On Nov. 28-29, the Kentucky Division of Waste Management (KDWM) conducted an independent field search for undocumented soil piles along Bayou Creek and Little Bayou Creek. Bayou Creek is on the west side of the Paducah Gaseous Diffusion Plant (PGDP) and Little Bayou Creek is on the east side.

Paducah Remediation Services (PRS) was notified that KDWM personnel would be conducting field reconnaissance of Bayou Creek and Little Bayou Creek to locate soil piles. The search began at South Acid Road and ended at Ogden Landing Road. Soil piles identified by the division were flagged, numbered, and global positioning system

(continued on page 5)

Confluence of Bayou Creek at Ohio River. *Photo by* **Nicole Burpo**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

Ohio River at Bayou Creek Sediment Sampling Event

Since beginning uranium enrichment in 1953, low levels of contamination have been documented in streams and sediment from the PGDP. Technetium (Tc^{99}) polychlorinated biphenyls (PCBs), heavy metals, and radionuclides have been documented by DOE and KDWM in these streams. While numerous samples have been collected from Bayou Creek and Little Bayou Creek, no samples have been collected at the Ohio River to determine the extent of contaminant migration, if any.

On Sept. 20, personnel from KDWM, U.S. Environmental Protection Agency (EPA), and KDWM's biological monitoring contractor, the University of Kentucky, performed the field investigation.

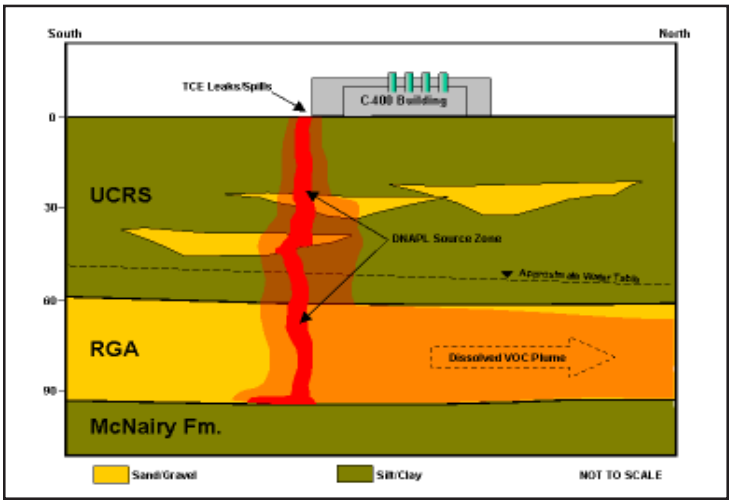
Sediment samples were collected from 10 sites at various distances from the mouth of Bayou Creek. Each site was flagged and photographed,

(continued on page 4)

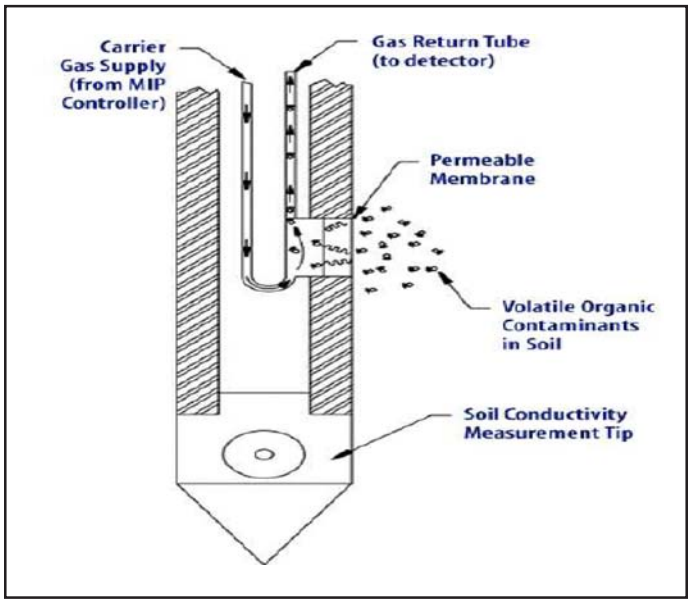
In this issue

MIP - Remedial Design Support at C-400 Building

Data obtained during an investigation near the C-400 Cleaning Building will be used to guide the placement of a remedy intended to help remove significant quantities of trichloroethylene (TCE) from groundwater. The data were gathered using a Membrane Interface Probe or MIP – a relatively new screening technology that allows investigators to quickly delineate subsurface zones where elevated levels of volatile organic contaminants, such as TCE, are present. During what was termed the C-400 Remedial Design Support Investigation (RDSI), MIP technology allowed investigators to better determine where the highest levels of TCE (known as TCE DNAPL – dense non-aqueous phase liquid) are located.



Above: Conceptual Site Model of TCE leak beneath C-400 Building and sub-surface composition.
Below: Schematic of MIP used at C-400 Building.
Model and schematic courtesy of DOE.



The RDSI required 51 MIP borings at various locations near the southeast and southwest corners of the C-400 Building. Locations were selected in advance using existing lab-generated sample data to identify where additional data were needed. Of the 51 borings, 33 were drilled to approximately 100 feet below ground surface, a depth that corresponds to the bottom of the site's contaminated aquifer known as the Regional Gravel Aquifer (RGA). Eighteen borings were drilled to 55 feet below ground level to the top of the RGA. As the MIP advanced down each hole, 20 measurements per foot were recorded. Measurements were correlated with existing sample data in order to determine when the probes had penetrated TCE DNAPL.

Preliminary results from the RDSI serve to confirm the presence TCE DNAPL near the southeast and southwest

(continued on page 6)

Edward Winner joins the PGDP Section

Edward Winner joined the PGDP section. He comes to the section from the Division of Air Quality, where he was employed as a risk analyst and toxicologist. Prior to Air Quality, Ed spent six years in the Risk Assessment Branch of Environmental Services.

Ed has a Bachelor of Science degree in zoology and a Ph.D. in environmental biology both from the University of Louisville. Additionally, Ed completed three years of postdoctoral studies at the Lions Eye Institute.

His responsibilities with the PGDP section include the dissolved phase plume, groundwater modeling, and the surface water operable unit along with risk assessment.

Surface Water Operable Unit Update

The *Surface Water Operable Unit (On-Site) Site Investigation and Baseline Risk Assessment Report* was submitted on Nov. 14. The document presents the results of the extensive soil/sediment sampling that was conducted in various internal ditches and in Sections 3, 4 and 5 of the North-South Diversion Ditch (NSDD). In all, 3,184 soil and sediment samples were evaluated. The report also presents the water quality data from the storm sewer sampling activities.

The total area of ditches evaluated was 44.9 acres. Potential "hot spots" (areas where contamination was detected above an indicator or characterization level) were identified in NSDD Sections 3 and 5 and in the internal ditches leading to Outfalls 001, 008, 010 and 015. These hot spot were 3.9 acres total, approximately 8.7 percent of the area evaluated, and are now being considered for a removal action. The data presented suggest that no removal actions are warranted for NSDD Section 4 and the internal ditches leading to 002, 011 and 012.

The report is a primary document with a 90-day review period. KDWM has until Feb. 12, 2007, to approve or comment on this document.

Section 3 of the North South Diversion Ditch, facing downstream. *Photo courtesy of* Jim Ethridge, *DOE.*

By **Brian Baker**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

Scrap Metal Removal

On Oct. 26, USEC condemned the railroad trestle south of the PGDP. The trestle was damaged due to heavy rains in October, and no scrap shipments have been sent since Oct. 11. However, during trestle repair, gondola loading activities continued.

As of Dec. 18, scrap metal from eight of the nine yards (D, A, C, P, P1, E, E1 and C1 yards) has been containerized, awaiting disposal at Energy Solutions. Additional equipment from the B-yard, consisting of a 15,000-pound forklift, a 5,000-pound forklift, a 5,000-pound tow motor, a welder and a Bush Hog mower assembly, were containerized. Residual scrap, grading activities and miscellaneous scrap from other yards (asbestos-containing materials, debris-laden soil piles, nickel ingot molds, legacy waste drums and the B-yard equipment mentioned above) were containerized in railroad gondolas for shipment as soon as the trestle is repaired.

The yards have been graded to promote drainage, and hydro-seeded. The final cleanup of the scrap yard will include removing railroad ties and track, fire hydrant mains and interior fences. Scrap will be placed in additional gondola cars for off-site disposal. The last shipment (expected to be about 15 gondola cars) is scheduled to be sent out in the near future and a media event is being scheduled to mark the end of the scrap metal removal project.

By **Leo Williamson**, *Ky. Division of Waste Management, Hazardous Waste Branch..*

For before and after pictures of the scrap metal removal project, please turn to page 7.

Sediment Sampling

(contined from page 1)

and GPS coordinates were taken. Sediment was analyzed for the following parameters: gross alpha and beta, heavy metals, Uranium-234, Uranium-238, PCBs, Tc^{99}, Plutonium-238, Plutonium-239/240, Cesium-137 Americium-241, and Neptunium-237. Results have been analyzed by PGDP personnel, and preliminary data indicate no contaminants above any risk level to the public.

KDWM and EPA employees collecting sediment on bank of Bayou Creek. *Photo and article by* **Nicole Burpo**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

C-405 Incinerator: Next to Go

The C-405 Incinerator was used for more than 30 years to prevent national security secrets from falling into the wrong hands. The C-405 Incinerator processed radiologically contaminated and uncontaminated items, including X-ray film and classified documents. To ensure complete destruction, items were shredded and then incinerated. In 2007 the roles will be reversed for this Cold War-era building. The place where materials were sent to be destroyed will be demolished. Plans and preparations are nearing completion to make the C-405 Incinerator's final task a reality.

The C-405 Incinerator is one of many buildings no longer in operation at the PGDP. Vacant buildings and structures are scattered throughout the Gaseous Diffusion complex. Over time many have become repositories for unwanted and outdated equipment.

The process for bringing down a contaminated Cold War era building is slow and deliberate. Inventories, historical reviews, worker interviews, radiation surveys, and utility isolations are required before an object or structure can be removed. To prevent the spread of contamination, the building itself may be painted and/or cleaned before it is taken down. Every step in the demolition process is designed to keep workers safe and to minimize or eliminate the escape of contamination.

By spring 2007 the entire C-405 Incinerator will be reduced to a concrete slab. The slab and area surrounding the incinerator will be addressed in the Soils Operable Unit, scheduled after 2009.

By **Brian Begley**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

The C-405 Incinerator Building due to be razed in 2007. *Photo courtesy of* Jim Ethridge, *DOE.*

Soil Piles

(contined from page 1)

(GPS) coordinates obtained. Approximate dimensions of piles and observations were recorded and some of the piles were photographed. During this field reconnaissance 22 soil piles were observed and recorded. The smallest was 5 feet by 5 feet and 4 feet high. The largest was 6-by-200 and 8 feet high..

On Nov. 30, KDWM personnel continued their search along with a PRS representative along Dyke Road and McCaw Road. Several soil piles of undetermined size were observed on the north side of the drainage ditch associated with KPDES Outfall 012. Additional soil piles were also noted in the woods on either side of Dyke Road on the south side of Outfall 013.

On Dec. 5 the remaining length of Little Bayou Creek was searched from Outfall 011 to Outfall 013. Additional soil piles were found at four places on the west side of the creek. No soil piles were observed on the east bank of the creek. A soil pile is located on the north side of Outfall 012 ditch. The soil pile is approximately 36-by-270 and 5 feet high.

This project will be ongoing until all undocumented soil piles in the WKWMA have been accounted for.

Soil pile among the trees near Outfall 12 on Little Bayou Creek. *Photo by* **Bill Clark**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

By **Vicki Voisard**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

Real-Time Remedial Field Deomonstration Project

DOE is funding an upcoming experimental project that will involve the application of non-destructive analysis for cost-effective, real time remediation of sediment and soil at the PGDP. This project is intended to demonstrate the utilization of radiation survey instruments, *in-situ* gamma spectroscopy instruments (for radionuclides), field laboratories and X-ray Fluorescence (XRF) devices which measure concentrations of metals. This study will reduce costs and decrease the time necessary to characterize potentially contaminated areas.

The FDP will be performed in the C-746-E and C-746-E1 yards of the (former) scrap yards. The E and E1 yards are located in the northern portion of the security-fenced area at the PGDP. The E and E1 yards were historically used to store scrap metal from cascade upgrade projects performed in 1978 and 1983. The scrap metal was removed in August 2005 and the yards have been graded to promote drainage. This project is being conducted by the Kentucky Research Consortium for Energy and Environment. This field demonstration project will utilize approaches developed by the US EPA, DOE and DOE National Laboratories to demonstrate the effectiveness of real-time characterization of outfall sediments, on-site ditches, and soils at the PGDP.

By **Leo Williamson**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

C-410 / 420 Building Infrastructure D&D

The Decontamination and Decommissioning (D&D) of the C-410/420 Complex is continuing. D&D involves the removal and disposition of materials from inside the buildings. When the project is complete, only the buildings' outer shells will remain. It is assumed that the buildings will be razed when D&D is complete.

Project engineers have been concerned that old process piping in these buildings could contain dangerous substances. A notable achievement during the last several months has been the removal of fluorine, hydrogen and hydrogen fluoride from piping located in building zones 42 and 43. With these potential hazards abated, project personnel are now able to remove the drained piping. This process is approximately 80 percent complete.

Asbestos is another potential hazard inside the complex. Some of this material, referred to as non-friable asbestos, is less dangerous than friable forms of the material. Friable asbestos is more easily broken up into small fibers that, once airborne, can become lodged in the lungs and cause serious health problems. Recent work inside the complex has focused on the removal of non-friable materials such as tiles. During the latter half of December, project personnel will begin removing friable piping insulation from zones 38 and 40, a process that requires the construction of special enclosures to contain asbestos fibers.

Stack on 410 / 420 Building blown over by wind in early Dec. Stack has since been removed. *Photo courtesy of* Jim Ethridge, *DOE.*

Many of the solid materials that have been removed from the complex are being shipped off-site by truck for disposal using 600 cubic foot intermodal containers. Sixty to 70 of these intermodals containing approximately 40,000 cubic feet of material have been shipped during the life of this project. Eventually, the waste materials may be shipped by rail as well. However, improvements first must be made to rail lines near the complex.

By **Todd Mullins** *, Ky. Division of Waste Management, Hazardous Waste Branch.*

C-400 MIP

(continued from page 2)

corners of the C-400 Building. In addition, TCE DNAPL was detected immediately to the east of the C-400 Building near the C-420 Building. Results show that large volumes of TCE DNAPL have reached the bottom of the RGA near the C-400 Building's southeast corner.

The information gained during the RDSI will be used during the design phase of the upcoming C-400 direct heating remedial action to focus the placement of heating electrodes where they are most needed. Ideally, results of this study will allow for a robust cleanup of subsurface TCE DNAPL while helping investigators avoid placing electrodes in areas where they are not needed, saving time and taxpayer dollars.

By **Todd Mullins**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

OREIS Results Update

From August to October 2006, nine sets of environmental data associated with the Paducah Gaseous Diffusion Plant (PGDP) were sent to Paducah Remedial Services (PRS) to be added to the Oak Ridge Environmental Information System (OREIS) database.

All of the samples were collected by KDWM personnel. One sample was split with the U.S. Department of Energy (DOE). The KDWM uses an independent laboratory for analysis.

Use the Acronyms / Key to "decipher" the OREIS Project Codes below.

By **Judy Dickerson and Vicki Voisard**, *Ky. Division of Waste Management, Hazardous Waste Branch.*

OREIS	Project Description
AIPWSSELK0506	May 2006 Residential Request Pond Sampling
AIPTANA0706	2006 DOE Deer Harvest
AIPWSCBCH0706	July #1 Sediment Basin Sampling Event
AIPWSCHCB0706	July #2 C-613 Sediment Basin/Lagoon Sampling Event
AIPWSRV0706	July #2 Outfall Sampling - Bayou Creek below K001
AIPWGRWMW0706	AIP July Well Sampling Event
AIPSOSL0806	NTS—Soil Sampling August 2006
AIPWGMW0806	AIP August 2006 Monitoring Well Sampling
AIPWGRW0806SPLIT	AIP August Well Sampling Event Split

ACRONYMS/ Key

AIP – Agreement in Principal
WG – Groundwater
MW – Monitoring Well
WS – Surface Water
CB – Catch Basin
(sediment basin outlet)
CH – Channel/Ditch
SE – Sediment
SO – Soil
SL – Surface Location
LK – Lake/Pond
TA – Tissue
NA – Not Available
RV – River/Stream
RW – Residential Well
Numbers – 1st - month, 2nd - year
05 – 5th month (May)
07 – 7th month (July)
08 – 8th month (August)
06 – year (2006)

Scrap Metal Pictures

Above: Scrap yards as they appeared before clean-up began.

Left: Scrap remains awaiting final clean-up and placement in gondola car.

Right: Graded ground with last remaining pieces of heavy equipment scrap.

Photos courtesy of Jim Ethridge, *DOE.*

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Environmental and Public Protection Cabinet
Department for Environmental Protection
Division of Waste Management
Hazardous Waste Branch
14 Reilly Road
Frankfort, KY 40601

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To request a free subscription, contact:

Nicole Burpo, Division of Waste Management
14 Reilly Road
Frankfort, KY 40601
(502) 564-6716 ext. 244
Fax (502) 564-2705
e-mail nicole.burpo@ky.gov.

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